REMARKS

Claims 1, 2, and 39-41 are pending. In the Office action mailed June 27, 2008, all claims stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2006/0099578 ("the '578 publication"), as evidenced by U.S. Patent No. 5,494,794 ("the '794 patent"). Claims 1 and 39-41 are also rejected under 35 U.S.C. § 103(a) as being obvious over the '794 patent in view of U.S. Patent No. 6,040,138 ("the '138 patent"). These rejections are addressed below.

The invention

The present inventors have discovered that expression of nuclear encoded mitochondrial energy metabolism genes is decreased in patients suffering from bipolar disorder. In view of this discovery, the present invention is directed to a microarray consisting of a solid support bound to nucleic acid molecules where at least 90% of the molecules either (a) encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain, which are naturally coded for by a nuclear gene, or (b) are fragments of (a). The claimed arrays can be used to diagnose bipolar disorder in a patient or to determine the patient's propensity for developing bipolar disorder.

Rejection under 35 U.S.C. § 102(e)

Claims 1, 2, and 39-41 stand rejected under § 102(e) as being anticipated by the '578 publication, as evidenced by the '794 patent. In making this rejection, the Office asserts that the '578 publication teaches a microarray consisting of probes for mitochondrial genes, in particular, mitochondrial energy genes. Citing the genes in Table 1 of the '578 publication as evidence, the Office asserts that this reference teaches microarrays where at least 90% of the nucleic acid molecules encode polypeptides of complex I, II, II, IV, or V. The Office further cites paragraph 64 of the '578 publication

as teaching arrays designed to detect genes related to oxidative phosphorylation (OXPHOS) and that such an array would include the probes to the protein complexes making up OXPHOS, which, as explained by the '794 patent, is composed of five complexes. Applicants respectfully traverse this rejection.

As initial matter, Applicants note that the polypeptides forming complexes I-V of the mitochondrial respiratory chain are made up of polypeptides coded for by both nuclear genes, which are located in the cell's nucleus, and mitochondrial genes, which are located in the mitochondrial genome.

To anticipate a claim, a reference must teach each and every limitation of that claim. In its rejection, the Office cites (a) the genes listed in Table 1 and (b) the reference to OXPHOS dysfunction in paragraph 64, to support the rejection. The genes listed in Table 1 are naturally coded for by the mitochondrial genome, as explained in paragraph 17 of the '578 publication. By contrast, claim 1 requires the nucleic acid molecules of the array to encode polypeptides of complex I, II, III, IV, or V that are naturally coded for by nuclear genes. Because the genes disclosed in Table 1 are mitochondrial genes rather than nuclear genes, the '578 publication does not teach this claim limitation and thus cannot form the basis for rejecting claim 1 as anticipated.

The reference to OXPHOS dysfunction in paragraph 64 of the '578 publication likewise cannot form the basis for rejecting claim 1. As noted above, the complexes forming OXPHOS include polypeptides coded for by both nuclear genes and mitochondrial genes. Claim 1 requires that at least 90% of the nucleic acid molecules bound to the array be nuclear encoded genes that encode a polypeptide of complex I, II, III, IV, or V. Because fewer than 90% of the polypeptides of complexes I-V are coded for by nuclear genes, the mere disclosure of OXPHOS genes also cannot anticipate claim 1.

For these reasons, the '578 publication fails to teach all limitations of claim 1. The rejection of this claim and its dependent claims 2 and 39-41 as being anticipated should therefore be withdrawn.

Rejection under 35 U.S.C. § 103(a)

Claims 1 and 39-41 are also rejected as being obvious over the '794 patent in view of the '138 patent. In making this rejection, the Office notes that the '794 patent teaches probes to detect mutations in mitochondrial DNA, and that defects in oxidative phosphorylation, which is carried out by complexes I, II, III, IV, and V, may play a role in the pathogenesis of Alzheimer's disease and Parkinson's disease. The Office therefore concludes that the '794 patent teaches probes related to oxidative phosphorylation. As the '794 patent does not teach placing oligonucleotide probes onto an array to detect expression, the '138 patent is cited as providing this teaching. Applicants respectfully traverse this rejection.

For a combination of references to render a claim obvious, the combination of references must teach all claim limitations. Because the '794 patent and the '138 patent, either alone or in combination, fail to teach an array where 90% of the nucleic acids encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain which are naturally coded for by nuclear genes, these references do not teach each and every claim limitation and thus cannot support the obviousness rejection.

The '794 patent solely discloses detecting mutations in mitochondrial genes for diagnosis of diseases such as Alzheimer's disease and Parkinson's disease, and is silent with respect to nuclear genes involved in the mitochondrial respiratory chain. Because the nucleic acid molecules recited in claim 1 encode polypeptides naturally coded for by nuclear genes, the '794 patent fails to teach this claim limitation.

This failure is not remedied by the '138 patent, as this reference likewise fails to teach the nucleic acid molecules recited in claim 1. Thus, no combination of the '794 and '138 patents can render claim 1, or its dependent claims, obvious. This rejection may also be withdrawn.

CONCLUSION

Applicants submit that the claims are in condition for allowance, and such action is respectfully requested. If there are any charges or any credits, please apply them to Deposit Account No. 03-2095.

Respectfully submitted,

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Jeffrey C Kessler Reg. No. 57,727 for

Karen L. Elbing, Ph.D.
Reg. No. 35,238

Clark & Elbing LLP
101 Federal Street
Boston, MA 02110
Telephone: 617-428-0200
Facsimile: 617-428-7045